Variability of Sediment and Nutrient Loading From the Colorado River To Matagorda Bay

U.S. GEOLOGICAL SURVEY

GULF COAST PROGRAM OFFICE

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Texas Water Development Board

USGS science for a changing world

Background

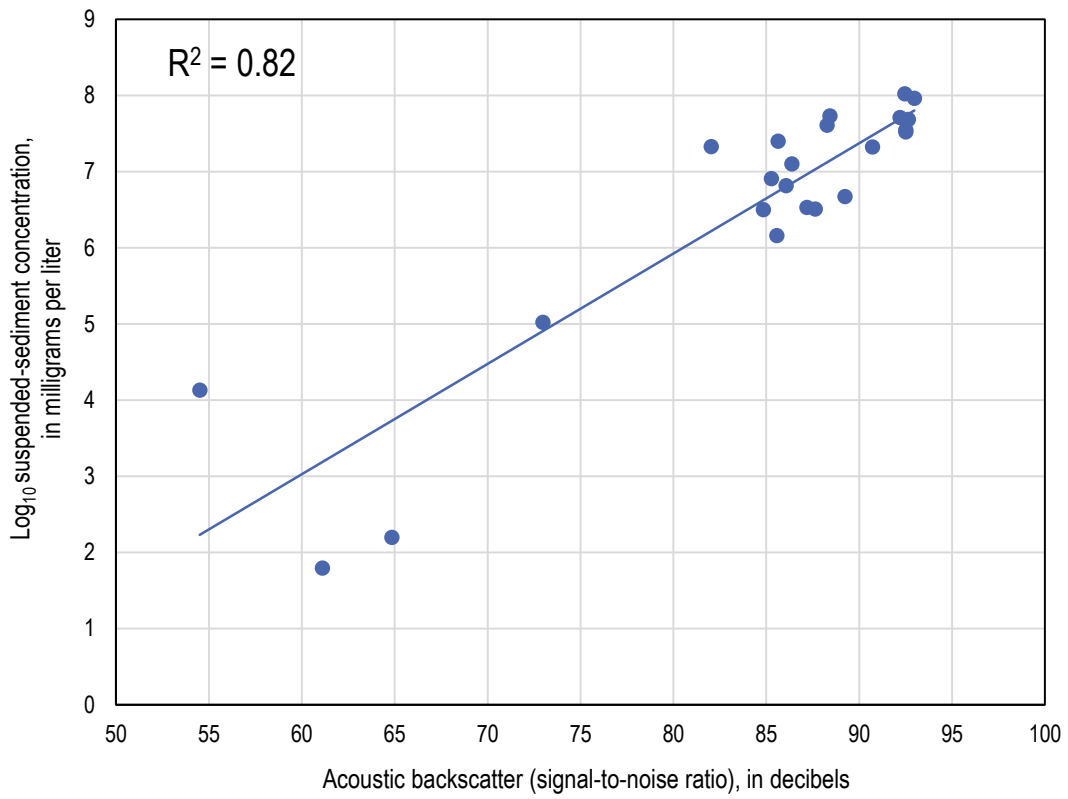
- This study is part of an effort to evaluate sediment and nutrient loading to bays and estuaries in Texas from major freshwater inflows.

- Streamflow and water-quality are monitored through discrete sampling and surrogate methods to improve our understanding of the temporal variability of nutrient and sediment loading to coastal systems.

Background – Surrogate models

- A preliminary study in the lower reaches of the Colorado River indicated a potential predictive relation for suspended-sediment and nutrients using a surrogate model based on acoustic backscatter.

- A permanent installation of a velocity/acoustic meter and additional data were needed to appropriately predict suspended-sediment concentrations and obtain a continuous record of suspended-sediment concentrations.



Project Tasks

A. Install, operate, and maintain an index-velocity gage in the lower reaches of the Colorado River.
B. Periodically and during high flow events, measure discharge and collect water quality, nutrient, and sediment samples at the location of the index-velocity gage.
C. Continue to develop the relationship between measures of optical turbidity and acoustic backscatter to further support development of the surrogate methodology for monitoring sediment and nutrient loads to estuaries on a continuous basis.

Task A: Streamgage Installation

- Index-velocity streamgage was installed in September 2016.
  - USGS Station 08162501 Colorado River near Wadsworth, Texas
  - Located under the Bridge at 521

- Streamflow rating is under development.
  - Currently have about 12 discrete discharge measurements
  - Need more to capture complete tidal cycle and a variety of hydrologic conditions

Task A: Streamgage Installation

Task B: Nutrient and Sediment Monitoring

Monitored water-quality constituents

- Nutrients
  - Ammonia
  - Nitrate
  - Nitrite
  - Total nitrogen
  - Total organic carbon
  - Dissolved organic carbon
- Physical properties
  - Temperature
  - pH
  - Dissolved oxygen concentration
  - Turbidity
  - Specific conductance
- Suspended-sediment

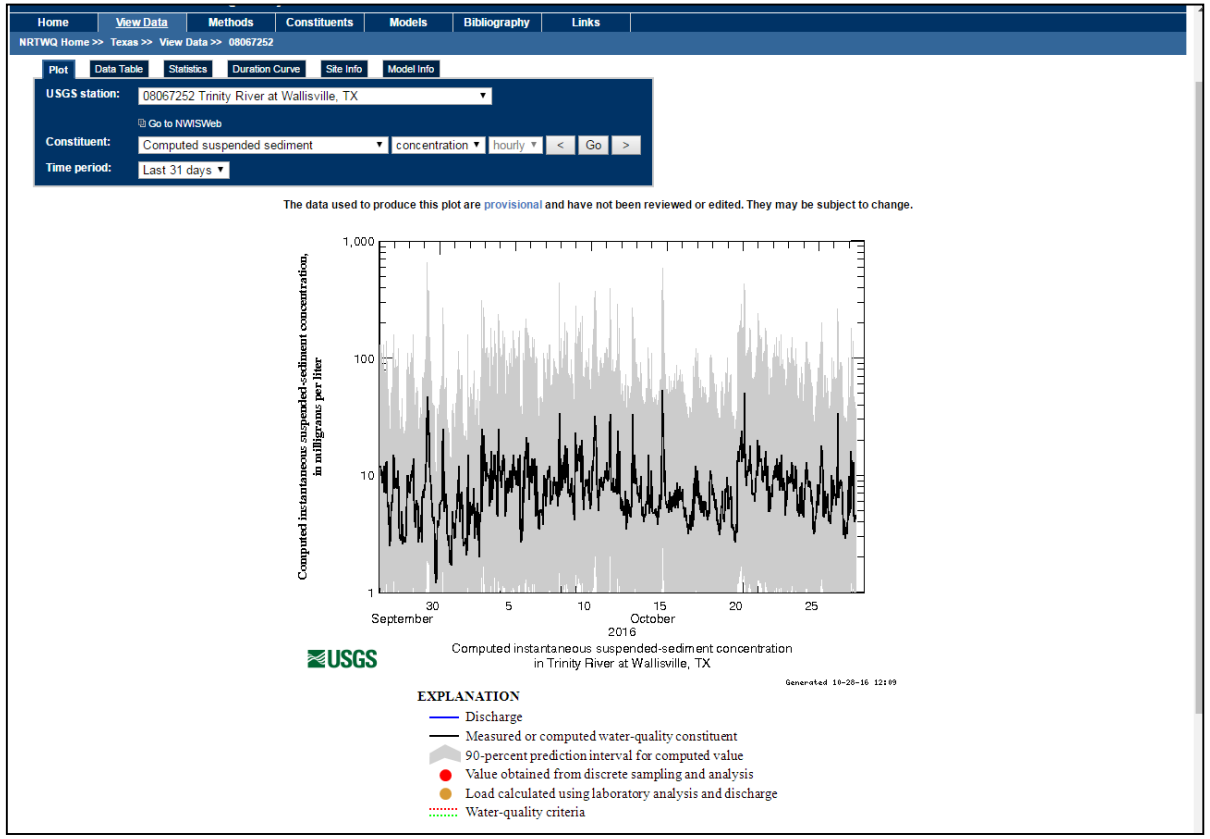
Photo Credit: Stephanie Glenn

Samples collected since streamgage installation: 11/3/2016, 1/12/2017, 2/23/2017

Task C: Surrogate model development

- Development of a surrogate model will be explored once streamflow rating is established and sufficient water-quality data is available.

- Continued data analysis indicates a relation between backscatter and suspended-sediment, a regression model can be used to provide a continuous record of suspended-sediment data.



Real-time sediment example from a station in the Trinity River

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